HTTP Overview

Minimum communication knowledge

HTTP overview


A tales of
World Wide Web

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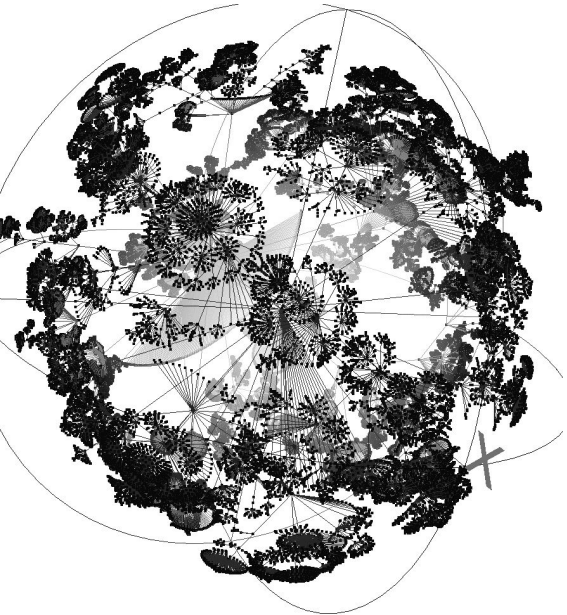
- 1969 : initiated by the ARPA as ARPANET project
- 1975 : made operational by DCA
  - apparition of TCP/IP
- 1983 : TCP/IP adopted as Military Standards
  - divided into MILNET and ARPANET
- 1985 : used by NSF that create NSFNet
- 1987 : NSF extend to US engineer/scientist
- 1990 : ARPANET end of life
- 1995 : NSFNet ceased its role as a primary Internet backbone network

Build over TCP/IP protocol

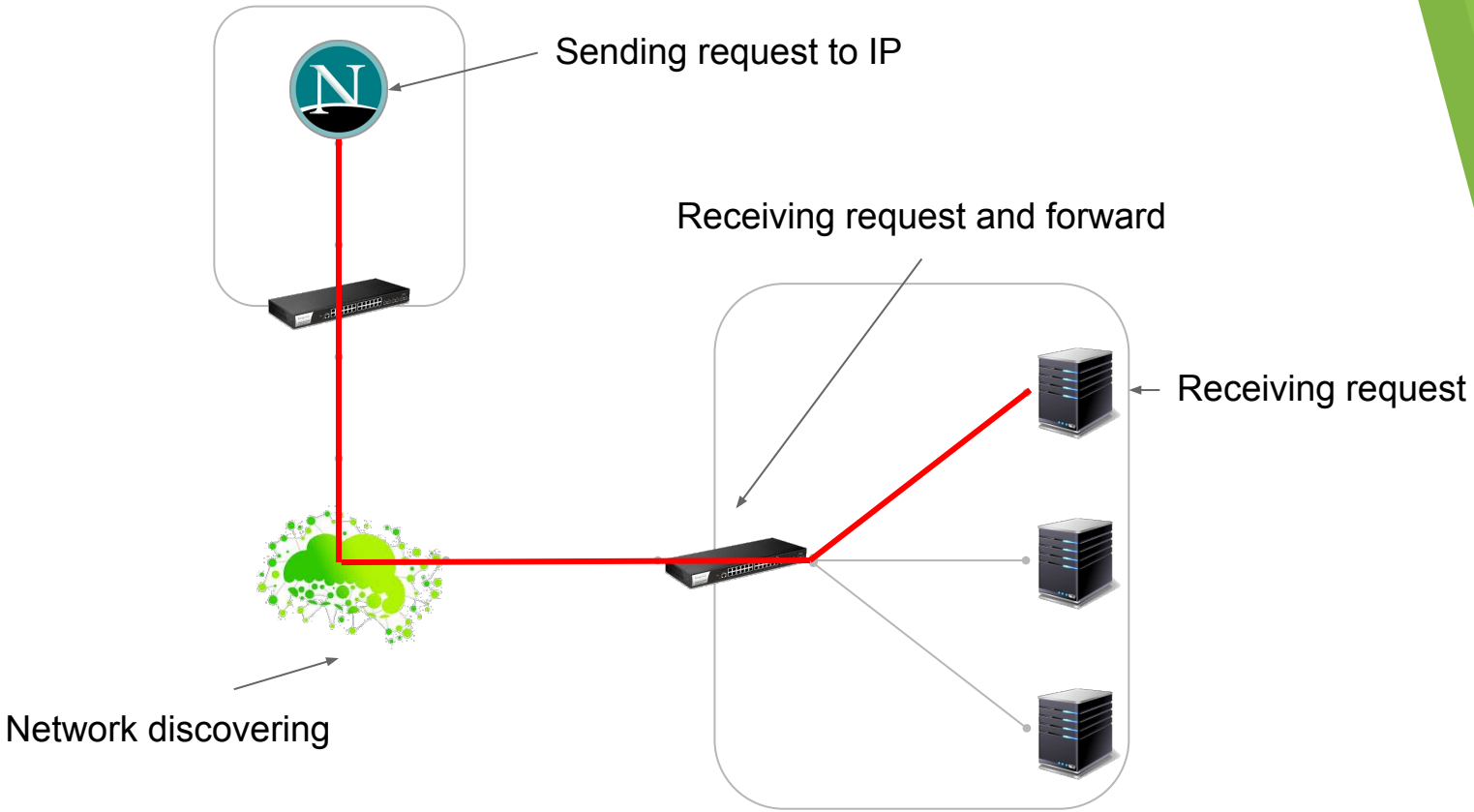
- Open protocol standards
- Independent from specific physical network hardware
- A common addressing scheme
- Standardized high-level protocols

Global network



- Subnetwork mesh
- Representing up to 500.000 nodes

TCP/IP principle



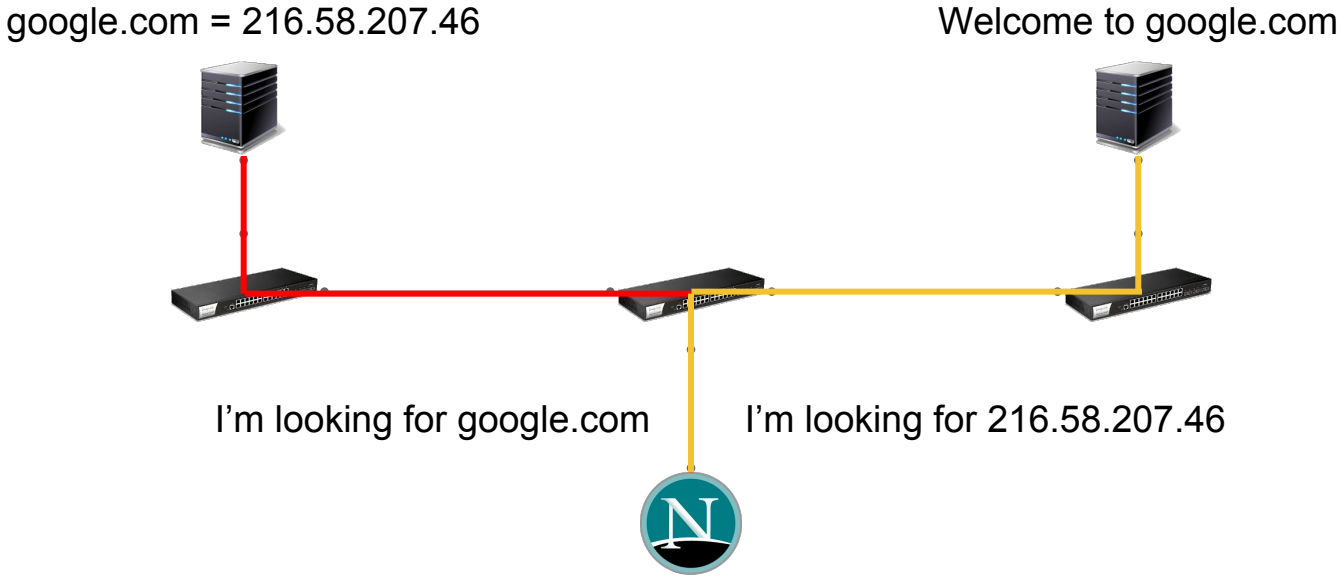
In the real life

traceroute to google.com (216.58.207.46)

- gateway (192.168.1.1)
- 62.155.246.29 (62.155.246.29)
- 217.239.42.134 (217.239.42.134)
- 80.150.170.30 (80.150.170.30)
- 108.170.251.193 (108.170.251.193)
- 72.14.232.51 (72.14.232.51)
- fra16s24-in-f14.1e100.net (216.58.207.46)

With DNS

- Domain namespace to IP translation
- Provided by DNS server




HTTP explained

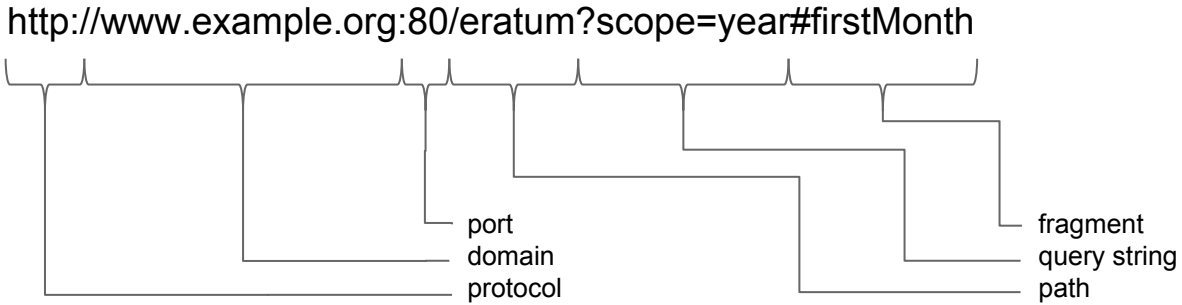
HTTP

- Communication protocol
- Based on request / response
- Make use of HTTP verbs (also called METHOD)
- Target a URI

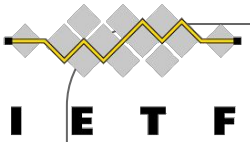

URI

The HTTP universal resource identifier

- Can be absolute to a domain
- Can be relative to a known domain
- Define a resource



What is a resource



A network data object or service that can be identified by a URI. Resources may be available in multiple representations (e.g. multiple languages, data formats, size, and resolutions) or vary in other ways.


HTTP verbs

Verbs

- Data handling method
- Data sending method
- Information sent to the server

The http verbs

- Can be safe (GET, HEAD)
  - SHOULD NOT have significant action
  - the user cannot be held accountable for side-effect

- Can be idempotent (GET, HEAD, PUT, DELETE)
  - side-effects of N > 0 identical requests is the same as for a single request

- Are non-idempotent

List of verbs

- **OPTIONS :** information about communication
- **GET :** retrieve whatever information about resource
- **HEAD :** identical to GET without body
- **POST :** create new subordinate of the resource
- **PATCH :** update an existing resource
- **PUT :** create or modify resource
- **DELETE :** delete a resource
- **TRACE :** remote invocation for loopback
- **CONNECT :** proxy dynamic switch

Message structure

HTTP request message structure

```
POST http://example.org/misc HTTP/1.1
Accept: text/plain; q=0.5, text/html
Accept-Charset: utf-8
Accept-Encoding: identity, compress, gzip
Content-Type: application/x-www-form-urlencoded

description=Lorem ipsum dolor sit amet, consectetur
adipiscing elit. Phasellus laoreet nunc nec tellus
blandit semper.&status=open
```

Request line

Message headers

Message body

HTTP response message structure

```
HTTP/1.1 201 Created
Content-Location: http://example.org/misc/123

<h4>description</h4>
<p>Lorem ipsum dolor sit amet, consectetur adipiscing
elit. Phasellus laoreet nunc nec tellus
blandit semper.</p>
```

Request line

Message headers

Message body

Message body by verbs

	Request	Response
GET	No	Yes
HEAD	No	No
POST	Yes	Yes
PUT	Yes	No
PATCH	Yes	No
DELETE	No	No
OPTIONS	No	Yes


Response status

HTTP response status

- First digit define purpose
  - 1xx: Informational
  - 2xx: Success
  - 3xx: Redirection
  - 4xx: Client Error
  - 5xx: Server Error

1xx Informational request

- Used by user agent and server in order to fulfill the connection requirements

2xx Success request

- **200 OK :** The request has succeeded.
- **201 Created :** The request has been fulfilled and resulted in a new resource being created.
- **204 No Content :** The server has fulfilled the request but does not need to return an entity-body, and might want to return updated metainformation.

3xx Redirecting

- **301 Moved Permanently :** The requested resource has been assigned a new permanent URI and any future references to this resource SHOULD use one of the returned URIs.

- **303 See Other :** The response to the request can be found under a different URI and SHOULD be retrieved using a GET method on that resource.

4xx Client error

- **400 Bad Request :** The request could not be understood by the server.
- **401 Unauthorized :** The request requires user authentication.
- **403 Forbidden :** The server understood the request, but is refusing to fulfill it.
- **404 Not Found :** The server has not found anything matching the Request-URI.

5xx Server error

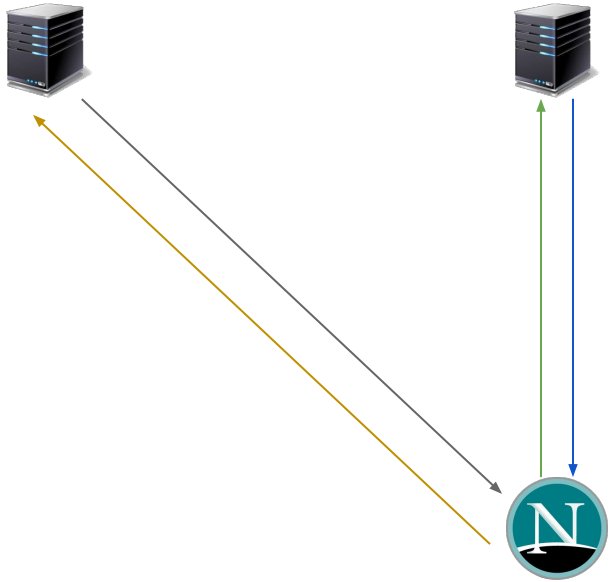
- **500 Internal Server Error :** The server encountered an unexpected condition which prevented it from fulfilling the request.
- **501 Not Implemented :** The server does not support the functionality required to fulfill the request.


HTTP security

TLS transport layer security

- end-to-end encryption
- protects against
  - man in the middle
  - http network sniffing
- Using AES encryption with third party validation

Third party validation principle



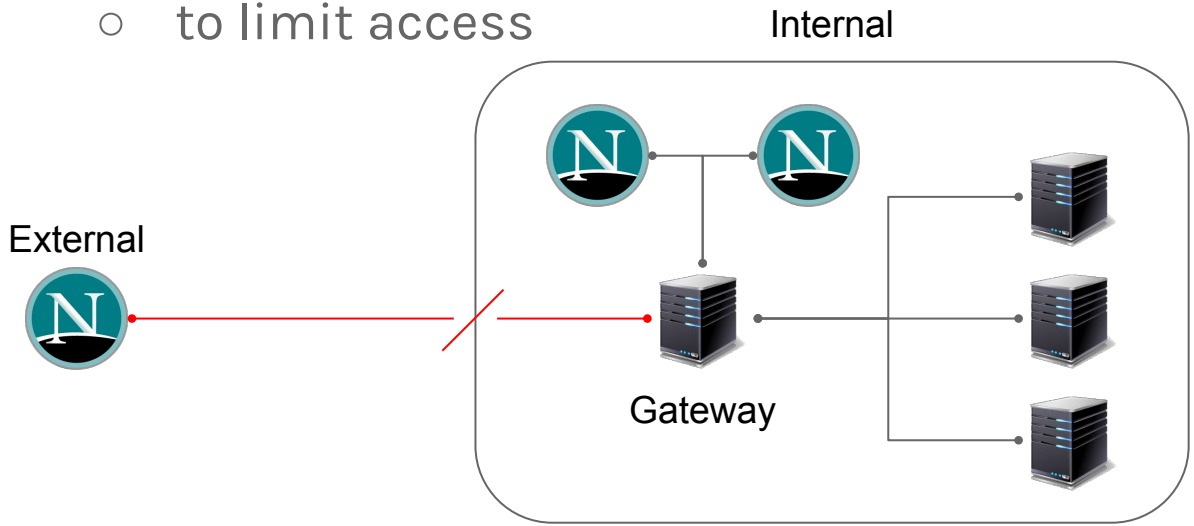
- Request connection
- Send the server certificate
- Request the server certificate validation
- Send the server certificate validation


Common infrastructure
elements

Gateway

- intermediary between server and client/other server

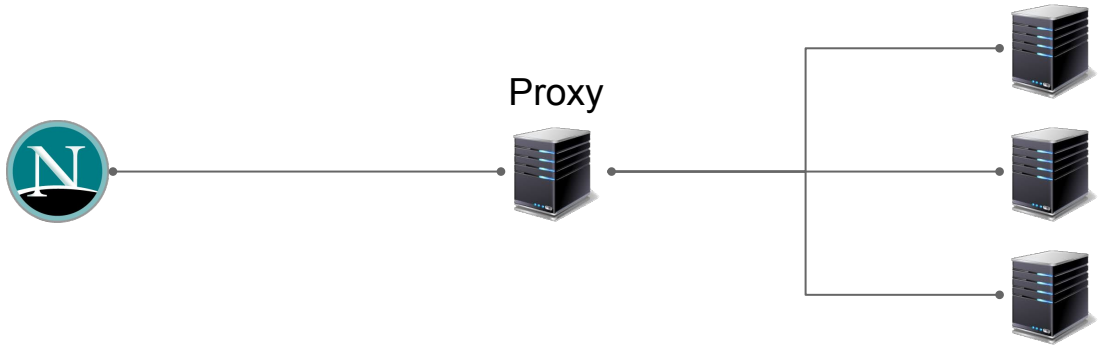
- Used
  - to limit access



Proxy

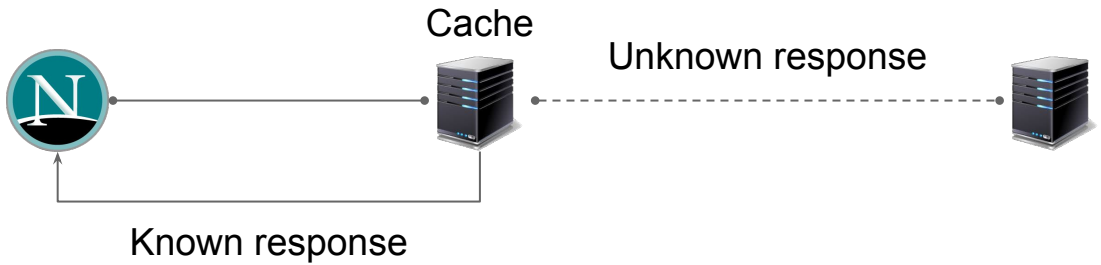
- intermediary between server and client/other server

- Used
  - to log access
  - as a facade for complex infrastructure
  - to improve security



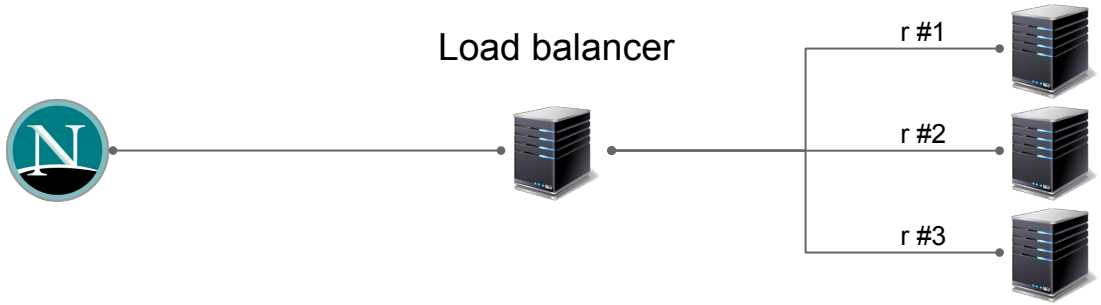
Cache

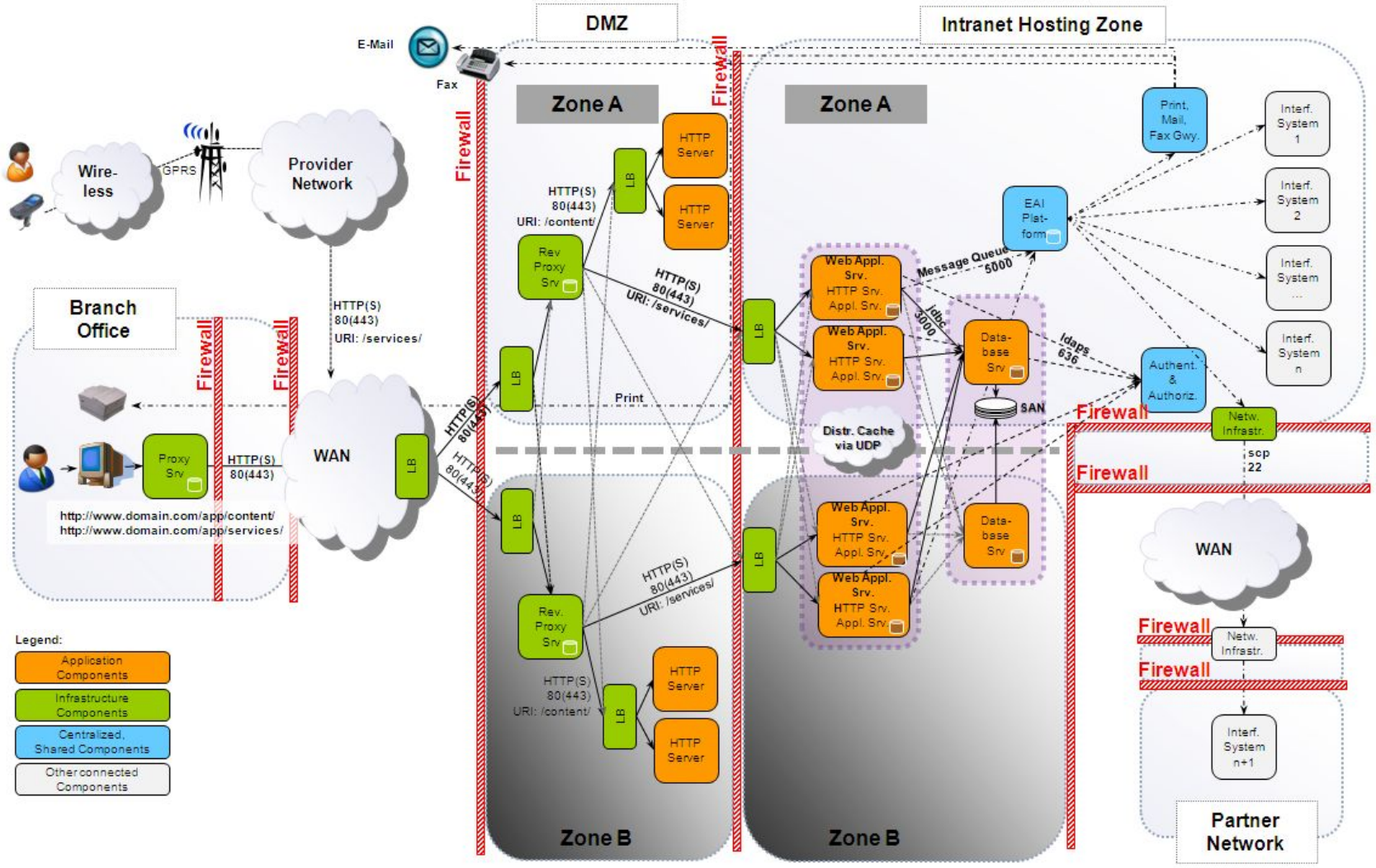
- Server itself
- Used
  - to served known response without server call



Load balancer

- Multiple server balancer
- Used
  - to balance the server load over multiple instance




DMZ
Intranet Hosting Zone
E-Mail
Fax
Firewall
Zone A
Zone A
Wire-less
GPRS
Provider Network
HTTP(S) 80(443) URI: /services/
Branch Office
Proxy Srv
HTTP(S) 80(443)
WAN
LB
HTTP Server
HTTP Server
HTTP(S) 80(443) URI: /content/
Rev Proxy Srv
HTTP(S) 80(443) URI: /services/
Print
Distr. Cache via UDP
Web Appl. Srv. HTTP Srv. Appl. Srv.
Web Appl. Srv. HTTP Srv. Appl. Srv.
Message Queue 5000
Jdbc 3000
Data-base Srv
SAN
EAI Plat-form
Print, Mail, Fax Gwy.
Interf. System 1
Interf. System 2
Interf. System ...
Interf. System n
Authent. & Authoriz.
ldaps 636
Netw. Infrastr.
scp 22
http://www.domain.com/app/content/
http://www.domain.com/app/services/
Zone B
Zone B
Partner Network
Interf. System n+1
Legend:
Application Components
Infrastructure Components
Centralized, Shared Components
Other connected Components